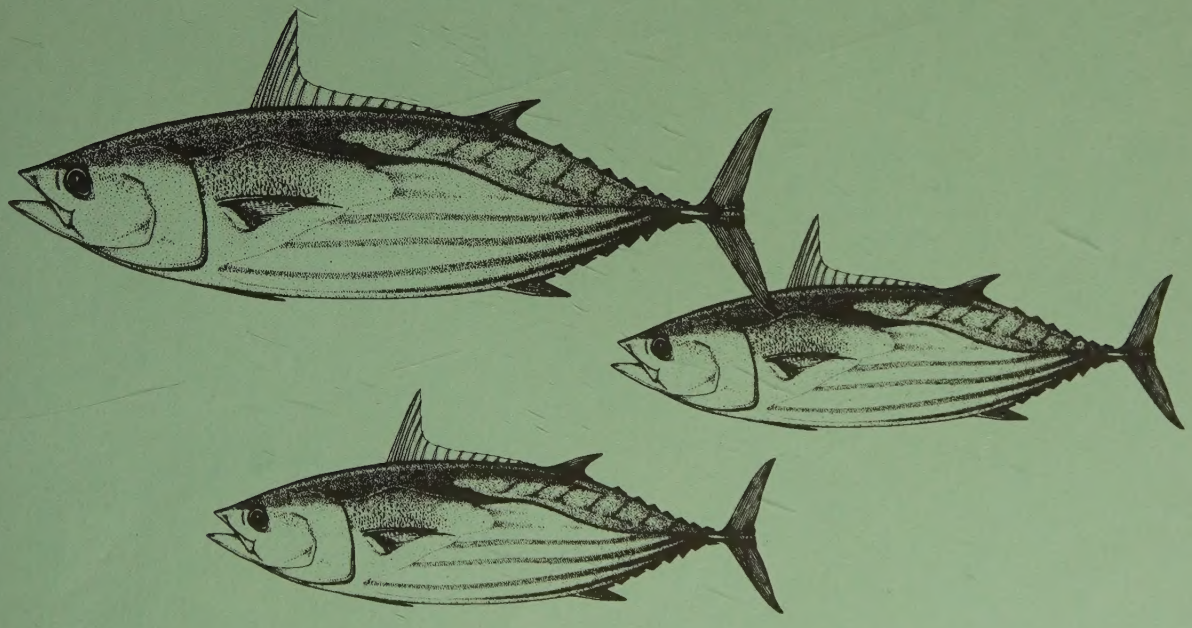
DECEMBER 1976
No. 12

FISHING INFORMATION

Southwest Fisheries Center-La Jolla, California



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DECEMBER 1976 , No. 12

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PREFACE

This publication, Fishing Information, appears monthly and contains 1) fishery advisory information, 2) a narrative description of pertinent surface temperature conditions, 3) charts of winds and pressures for the eastern North Pacific, 4) charts of sea surface temperature for the North Pacific and eastern tropical Pacific, and 5) charts of subsurface temperature structure in the eastern North Pacific.

A supplement to Fishing Information appears at 15-day intervals throughout the year. It contains a chart of sea surface temperature (contoured at 2°F (1°C) intervals) from Baja California to Vancouver Island out to about 135°W. Special bulletins are published in conjunction with the 15-day sea surface temperature charts which include short-term projections of albacore distribution and locations of productive fishing areas, information on oceanographic and atmospheric conditions, and other information as is appropriate during the albacore fishing season.

The Secretary of Commerce has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department.

Submitted for publication - January 24, 1977

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ENVIRONMENTAL CHARTS ANALYZED BY:

F. Miller (Figures 8 and 9)
J. Renner (Figures 1, 2, 3, 4, 5, 6, 7, 10 and 15 day Supplement)

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    L. Collins at Kaines Island Island Light; I.G. McNeil at Amphitrite Point Light
Scripps Institution of Oceanography, La Jolla, California

Expendable bathythermograph and salinity observations are made by the mates and engineers of the *Californian* of the Matson Navigation Co. The data are processed under supervision of D. R. McLain at the NMFS Pacific Environmental Group, Monterey, California, using computer facilities of the Fleet Numerical Weather Central, Monterey. The project is partially supported by the National Sicence Foundation and the Office of Naval Research.

Due to budget restrictions only the San Francisco - Honolulu sections will appear regularly in the future. At certain times sections between Honolulu and other U.S. west coast ports will appear as available.

Sea Surface Temperature and Environmental Conditions

Forrest R. Miller

Eastern North Pacific

Seasonal cooling over a large part of the eastern north Pacific Ocean progressed at less than the normal rate, especially north of 35°N and east of 155°W. In this part of the Pacific surface pressures were above normal and winds were more southerly than normal (Figure 2). In November 1976 the high pressure ridge was oriented nearly north-south and extended into British Columbia. In December 1976 the high pressure ridge remained along the U.S. west coast, but the ridge line moved down the coast to near 40°N. A comparison of Figures 1 and 2 show that surface pressures and winds east of 155°W and north of 40°N were characteristic of a prevailing southerly air flow over much of the northeast Pacific. The northward bending of the sea surface temperature (SST) isotherms between 125°W and 135°W (Figure 3) shows the effects of the persistent high pressure ridge along the U.S. west coast. The effects of a dominating west coast high pressure ridge is shown more clearly in Figure 5. This chart shows a large area of greater than 2°F (1.1°C) above normal SST's north of 40°N and east of 140°W. Another area with SST's more than 2°F (1.1°C) above normal developed in October 1976 along the coast south of 35°N and have increased to values greater than 4°F (2.2°C) along the west coast of Baja California in December (Figure 5). The SST's along the entire coast and out to approximately 135°W have been more than 2°F (1.1°C) greater than in December 1975 (see Figure 7). A similar pattern existed in November 1976.

In contrast to the below-normal winds and cloud cover and the above-normal surface pressures and SST's in the northeast Pacific, the north central Pacific has been under the domination of a deep, low-pressure system (Figure 2). This low-pressure system, centered in the Aleutian Islands, was deeper than normal and caused strong southerly winds to the south and east of the center between 35°N and 45°N where considerable ocean mixing took place. As a result, large areas of below-normal SST's persisted in this area (Figure 5). The frequent eastward movement of weather fronts and strong winds along the southern periphery of the Aleutian low resulted in SST's 2°F (1.1°C) or more below those in December 1975 (Figure 7). Over the subtropical region south of 35°N the SST's were near normal except along the west coast of Baja California.

Western North Pacific

The Aleutian low pressure system had a pronounced effect on the atmosphere and ocean circulations during December, as it did in October and November 1976. The lower pressures and high wind belts around the low center remained over the north central Pacific where they had developed in November. Therefore, the SST patterns (Figure 4) and SST deviations from normal (Figure 6) were not markedly different from those in November. Seasonal cooling took place at slightly slower rates than normal north of 35°N partly because of the eastward shift of the major Pacific low pressure center. Along the east coast of Japan and over the subtropical region, scattered areas of warmer-than-normal SST's (Figure 6) reflected the dominance of higher pressures and lighter winds than east of 165°E and north of 35°N.

Eastern Tropical Pacific

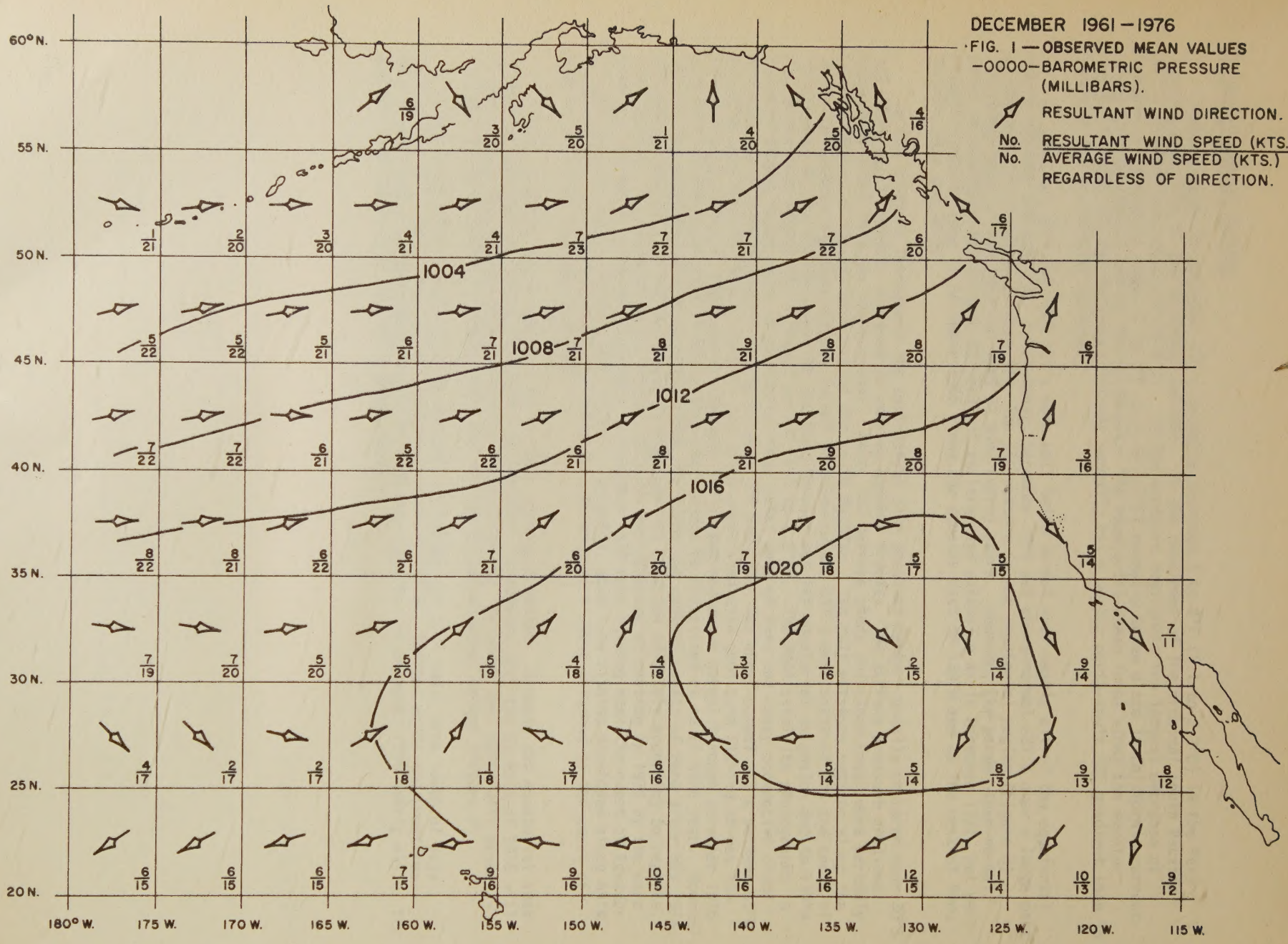
From November to December SST's normally increase 2 to 4°F (1.1 to 2.2°C) in the Peru Current from 30°S to the Galápagos Islands. In the remainder of the tropical south Pacific SST's increase less than 1°F (0.6°C). In the northern hemisphere the largest decrease of seasonal temperature, about 2 to 3°F (1.1 to 1.7°C) normally takes place in California current along Baja California and to the southwest. The equatorial ocean front along the equator between Ecuador and the Galápagos Islands normally has a weaker north-south SST gradient than in November due to seasonal warming.

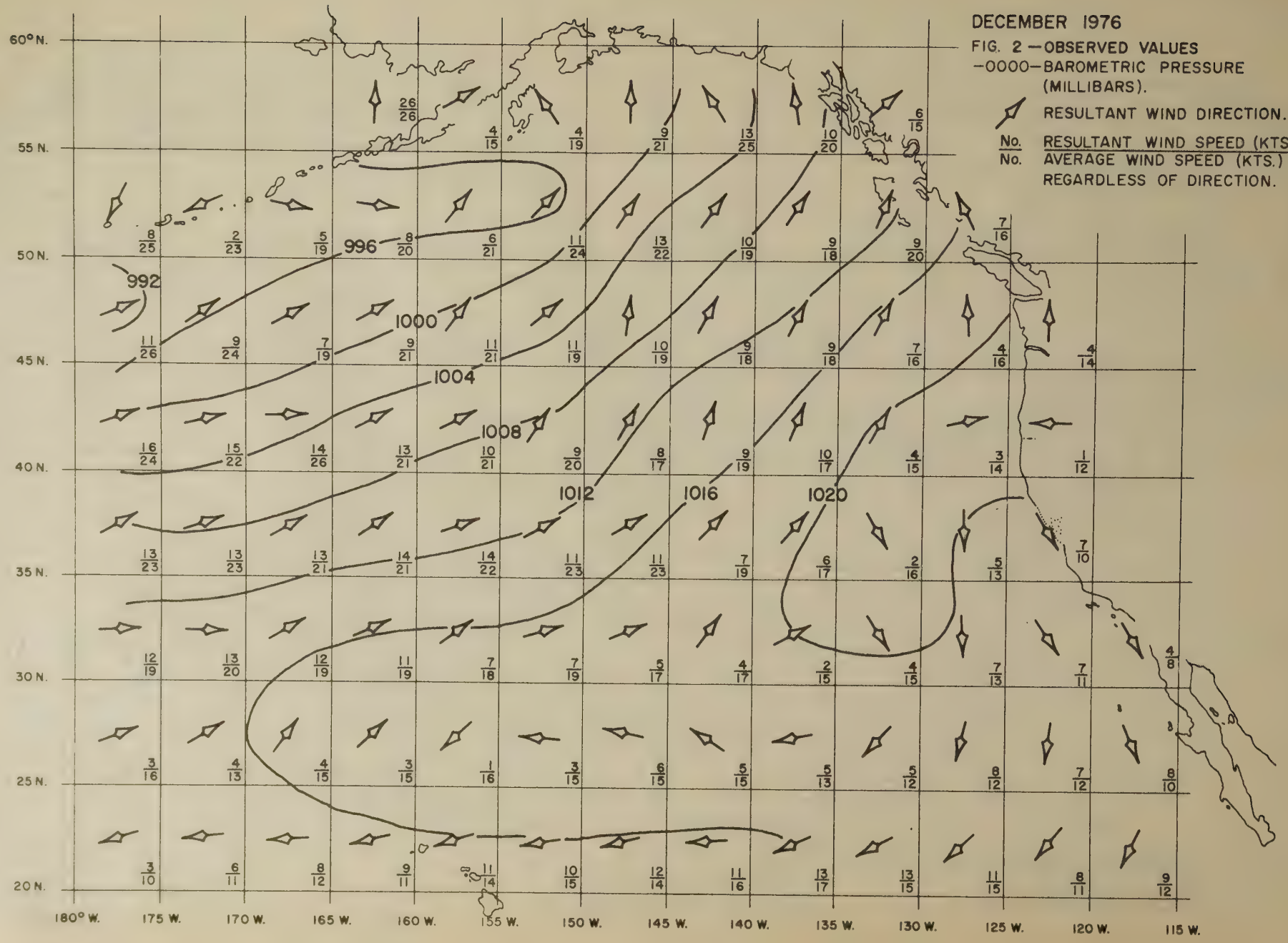
In December 1975 and 1974 SST's were well below normal over nearly all of the equatorial region between 5°N and 5°S. In contrast, December 1976 had above-normal SST's over a large part of the equatorial region (Figure 9). The SST pattern in the equatorial region (Figure 8) resembled those of the 1972 and 1965 El Niño (warm) years. However, the warmer-than-normal areas in December 1976 (Figure 9) were not as large and extensive as in December 1972, but were slightly greater than in December 1965 along the equator east of 130°W and to the west of Peru between 80°W and 90°W.

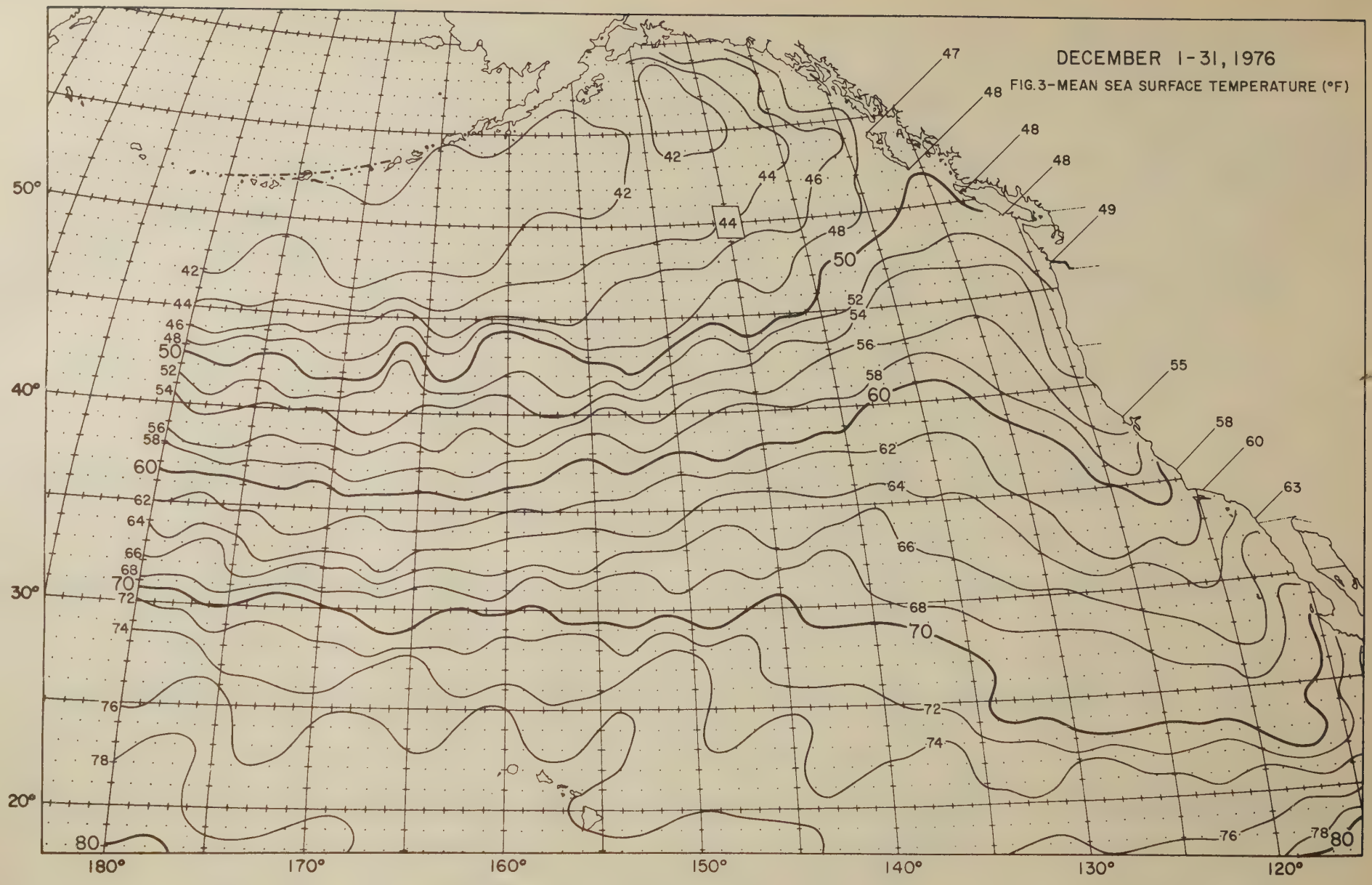
In the southern hemisphere the subtropical high pressure center, usually centered near 30°S and 90°W, was frequently weakened by passing weather fronts. The surface pressure gradient between 80°W and 95°W was below normal. Also, the surface winds and cloud cover were markedly below normal over the eastern part of the south Pacific. The only offshore regions along the coasts of Ecuador and Peru showing normal or below-normal SST's were north of 5°S and south of 15°S. Most of the offshore part of the Peru Current and its equatorial extension out to 130°W had warmer-than-normal SST's from 2 to 4°F (1.1 to 2.2°C). The NOAA satellite photographs in December showed large areas of unusually clear skies west of Peru and heavy convective cloud activity east of the Galápagos Islands between 5°N and 5°S. The above-normal SST's between 85°W and 90°W from 10°N to 10°S (Figure 9) are often associated with good tuna fishing as was the case during previous El Niño years. Because SST's remained above normal through December 1976 over most of the equatorial Pacific, this year should be classified as an El Niño year. However, because the extensive warming started along the north and central coasts of Peru after May 1976, the coastal marine life and anchoveta fishing was not affected adversely according to reports. Fishing along the coast of Peru south of 15°S was not affected at anytime in 1976 by the warm water to the north. However, from May to November 1976 tuna fishing near the coast of Ecuador was not good as SST's remained above normal. Recently, good tuna fishing developed along 85°W south of the equator and in November some periods of good fishing returned to the coast of Ecuador as SST's returned to normal.

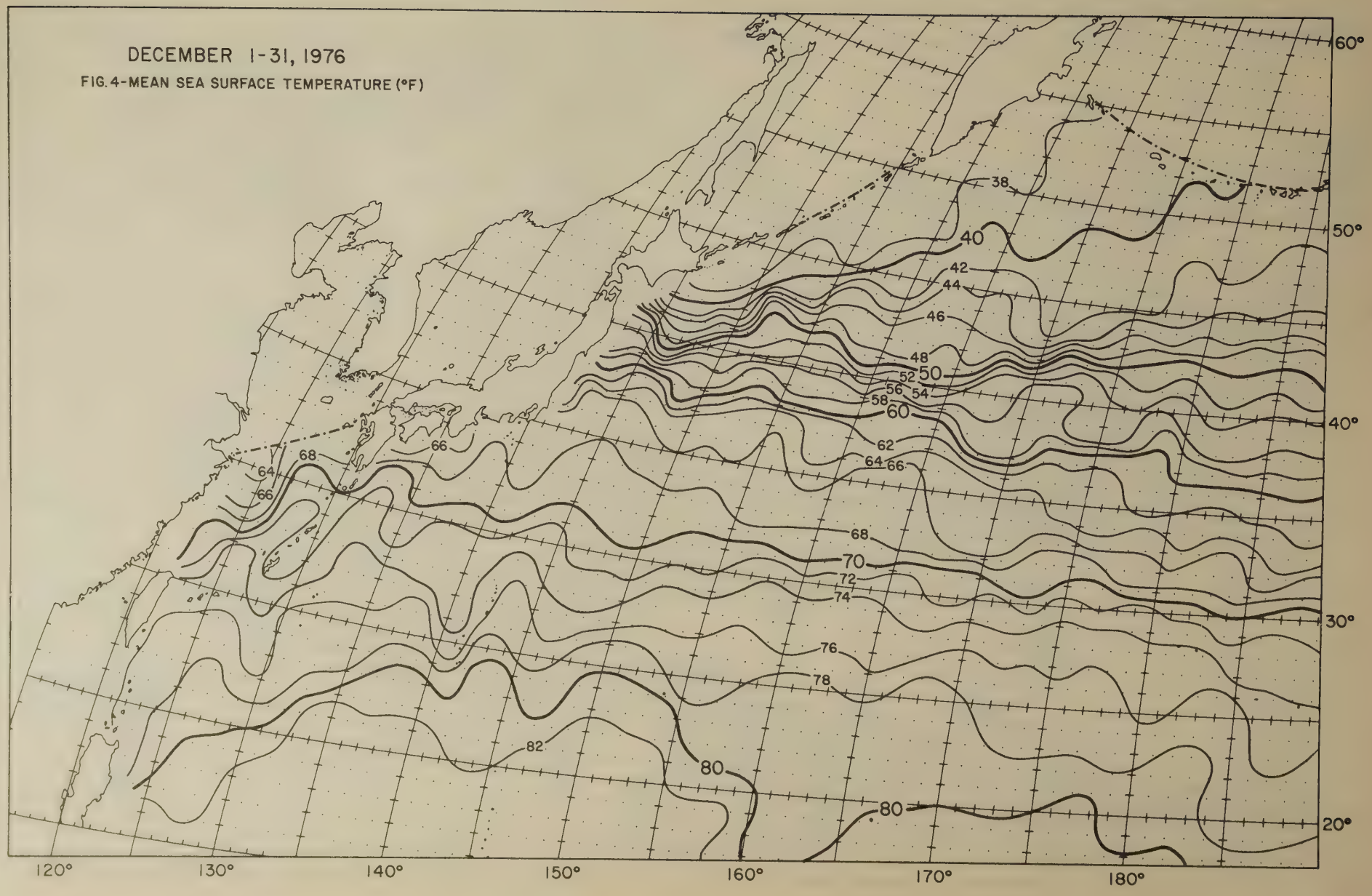
In the tropical region west of 140°W SST's were near normal. Because the equatorial area covered by above-normal SST's diminished in December, it appears that the El Niño of 1976 will be confined to the eastern tropical Pacific east of 140°W. By March 1977 SST's will probably decrease to below normal in those areas now covered by above-normal values (Figure 9).

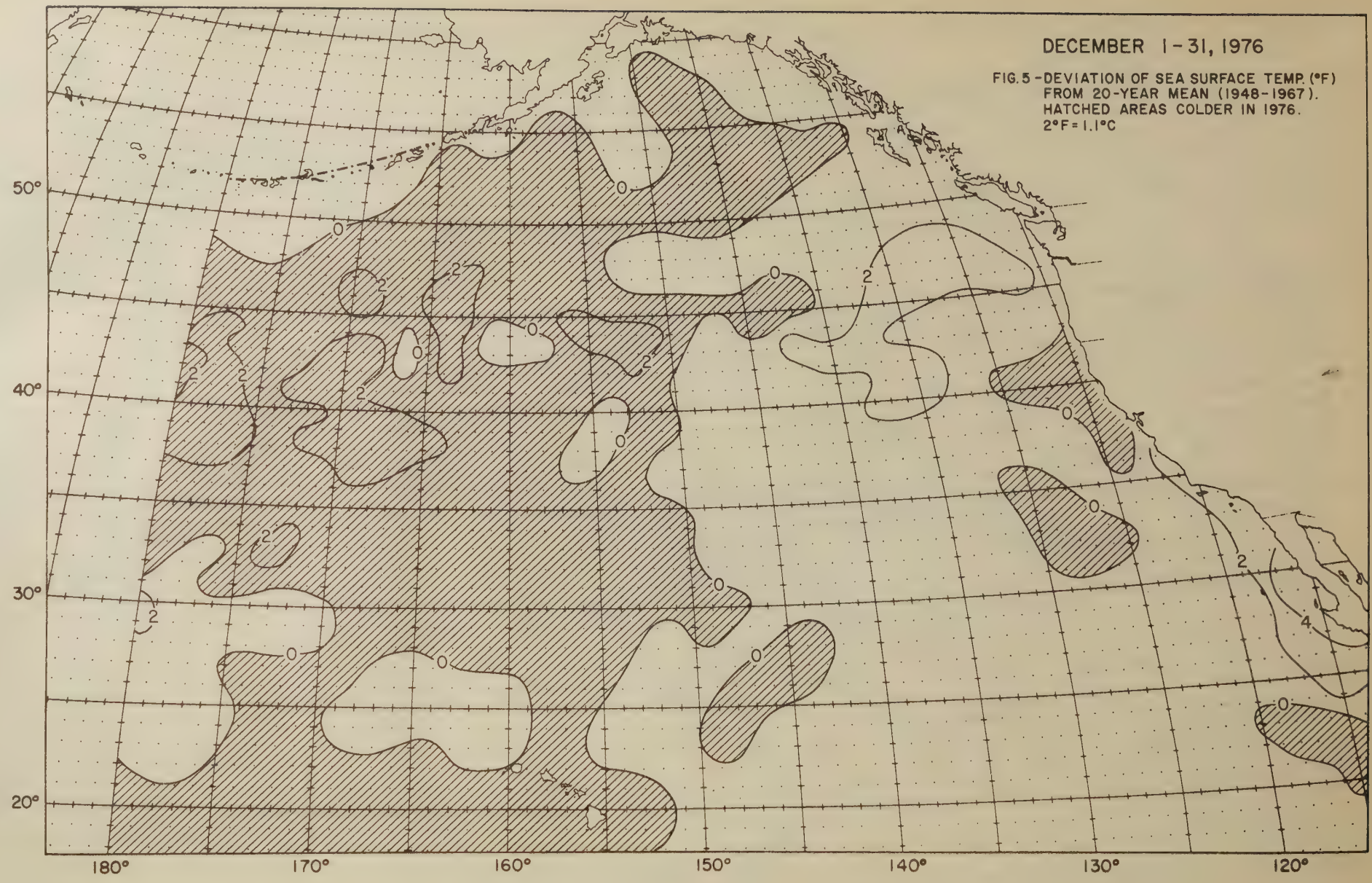
Except for below-normal SST's in the Gulf of Panama and in a small area south of Baja California, SST's were above normal everywhere east of 140°W. Surface winds and pressures were significantly below normal in this part of the tropics. In December 1975 nearly all of the eastern tropical Pacific had SST's below normal.

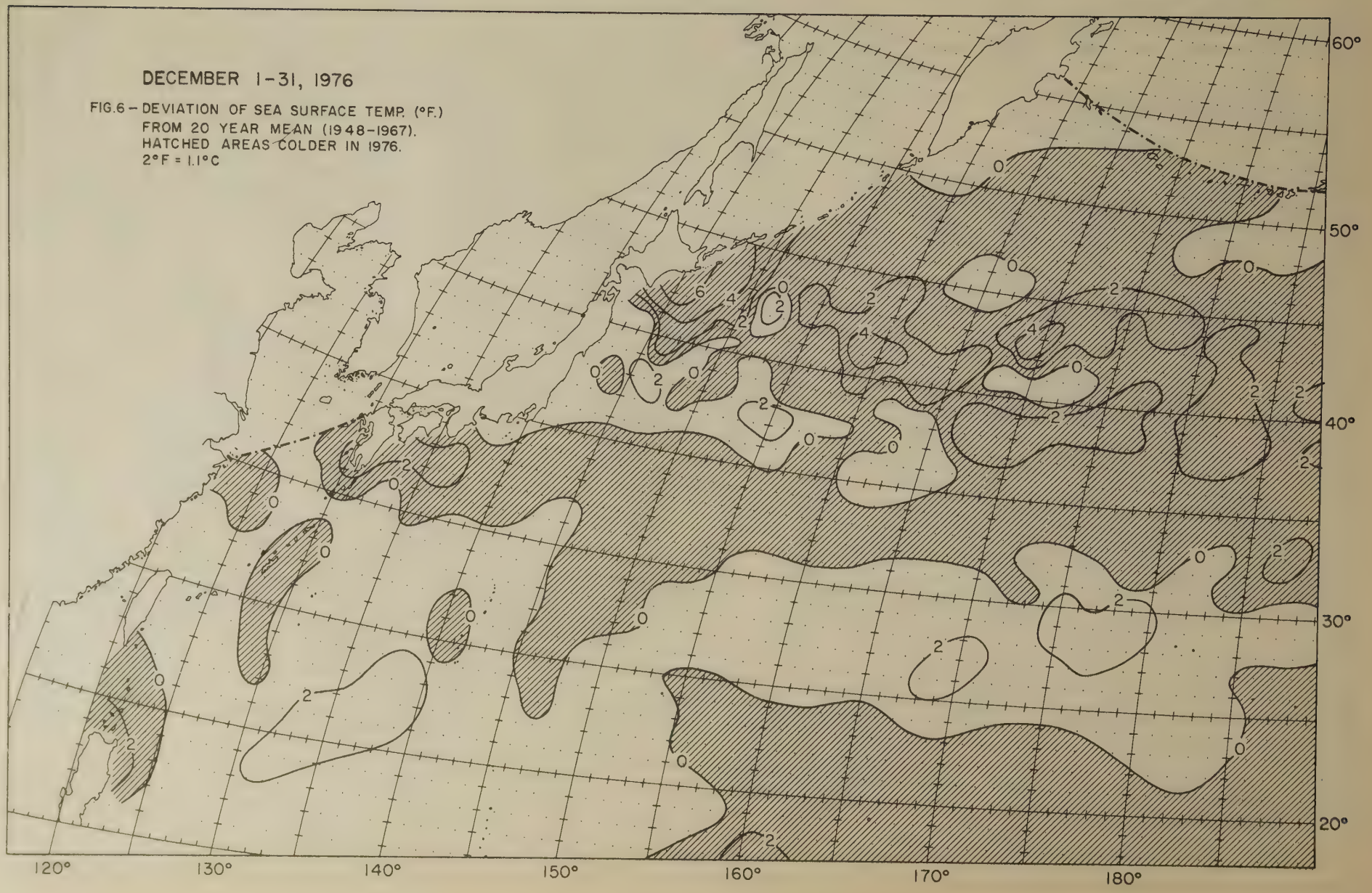

DECEMBER 1961 – 1976
FIG. 1 — OBSERVED MEAN VALUES
–0000– BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. RESULTANT WIND SPEED (KTS.)
No. AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
1004
1008
1012
1016
1020
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

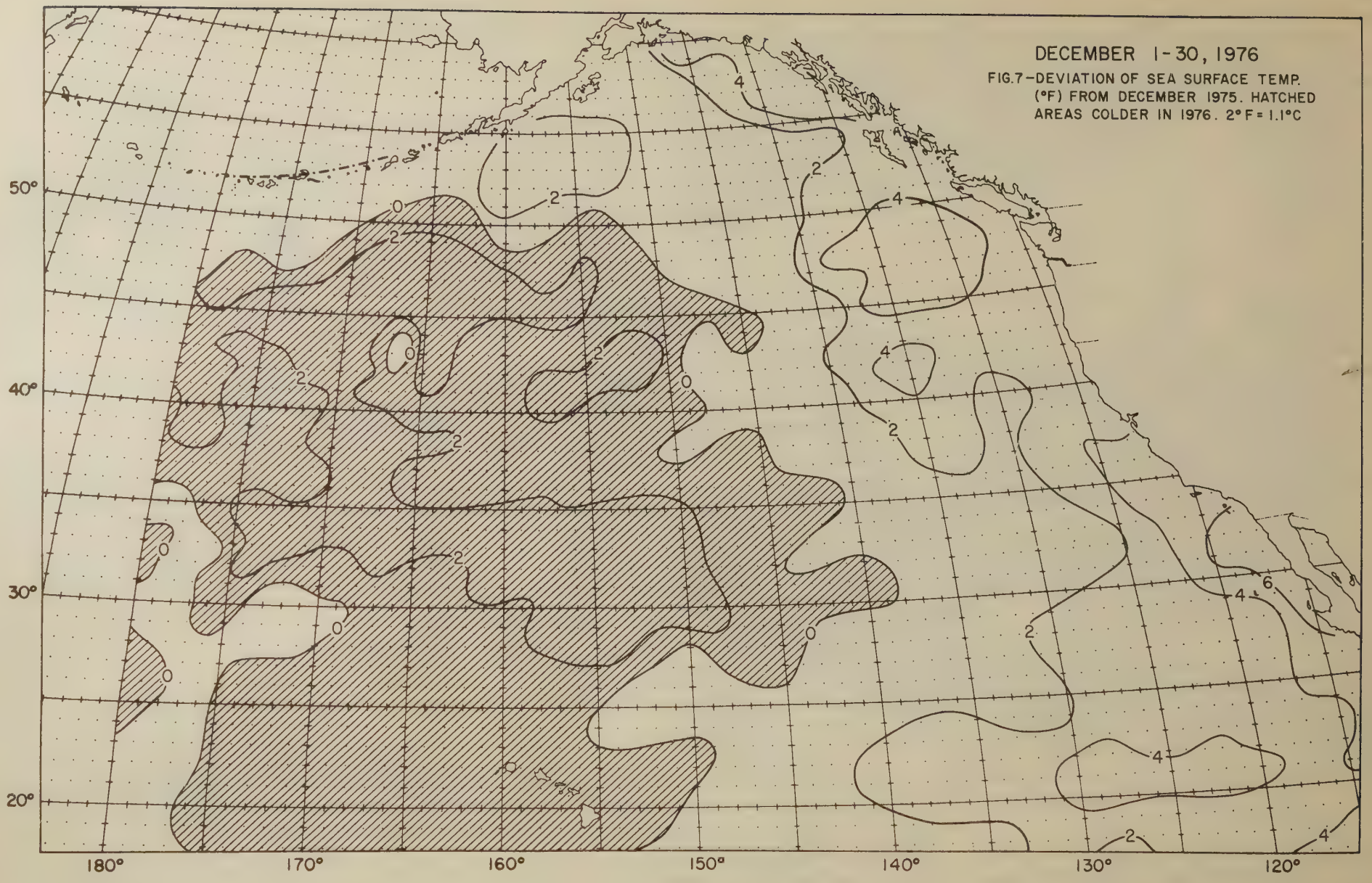

DECEMBER 1976
FIG. 2 —OBSERVED VALUES
-0000-BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. RESULTANT WIND SPEED (KTS.)
No. AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
992
996
1000
1004
1008
1012
1016
1020

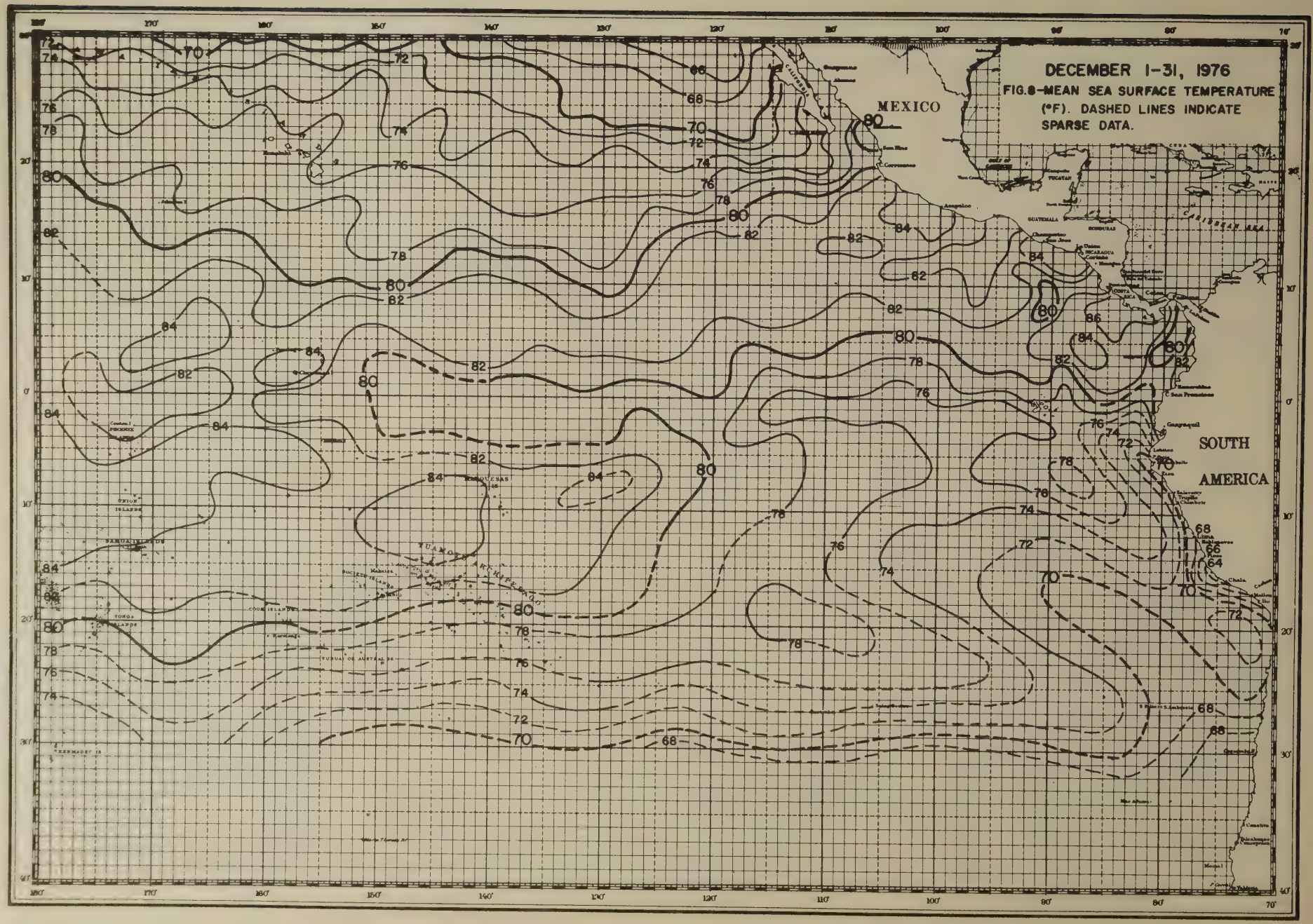

DECEMBER 1-31, 1976
FIG.3-MEAN SEA SURFACE TEMPERATURE (°F)
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°


DECEMBER 1-31, 1976
FIG. 4-MEAN SEA SURFACE TEMPERATURE (°F)
60°
50°
40°
30°
20°
120°
130°
140°
150°
160°
170°
180°
38
40
42
44
46
48
50
52
54
56
58
60
62
64
66
68
70
72
74
76
78
80
82


DECEMBER 1-31, 1976
FIG. 5 - DEVIATION OF SEA SURFACE TEMP. (°F) FROM 20-YEAR MEAN (1948-1967). HATCHED AREAS COLDER IN 1976. 2°F = 1.1°C
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°
0
2
4


DECEMBER 1-31, 1976
FIG.6 – DEVIATION OF SEA SURFACE TEMP. (°F.)
FROM 20 YEAR MEAN (1948-1967).
HATCHED AREAS COLDER IN 1976.
2°F = 1.1°C
60°
50°
40°
30°
20°
120°
130°
140°
150°
160°
170°
180°


DECEMBER 1-30, 1976
FIG.7-DEVIATION OF SEA SURFACE TEMP. (°F) FROM DECEMBER 1975. HATCHED AREAS COLDER IN 1976. 2° F = 1.1°C
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°


DECEMBER 1-31, 1976
FIG.8-MEAN SEA SURFACE TEMPERATURE (°F). DASHED LINES INDICATE SPARSE DATA.
MEXICO
SOUTH AMERICA

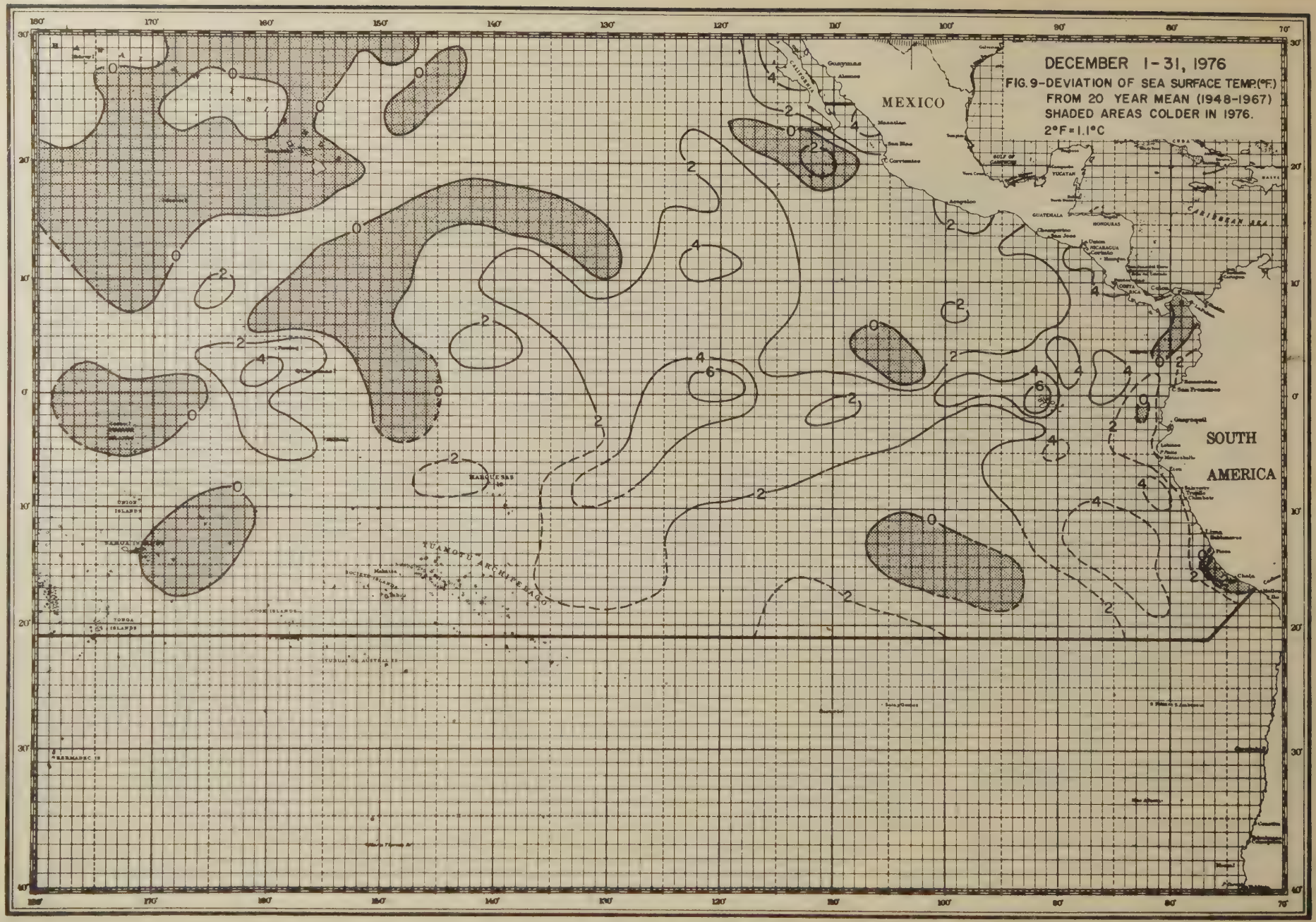

DECEMBER 1-31, 1976
FIG. 9-DEVIATION OF SEA SURFACE TEMP.(°F.)
FROM 20 YEAR MEAN (1948-1967)
SHADED AREAS COLDER IN 1976.
2°F = 1.1°C
MEXICO
SOUTH
AMERICA
TUAMOTU ARCHIPELAGO
MARQUESAS
UNION ISLANDS
TONGA ISLANDS
COOK ISLANDS
TUBUAI OR AUSTRAL IS.
BERMADEC IS
GUATEMALA
HONDURAS
NICARAGUA
COSTA RICA
PANAMA
CARIBBEAN SEA
GULF OF CALIFORNIA
YUCATAN
CUBA
HAITI
Guaymas
Mazatlan
San Blas
Acapulco
Guayaquil
Callao
Valparaiso
Chile
Peru

FIGURE 10

SHIP CALIFORNIAN

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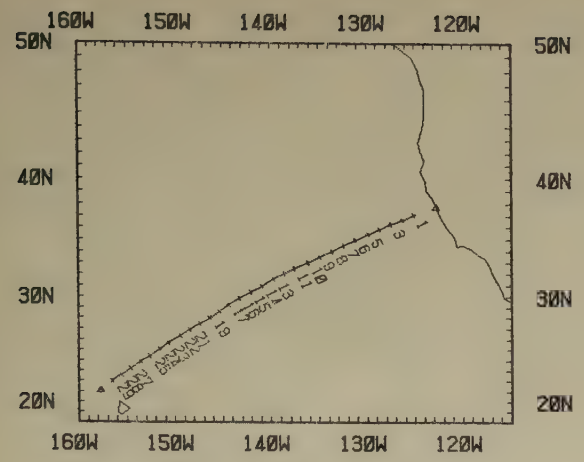

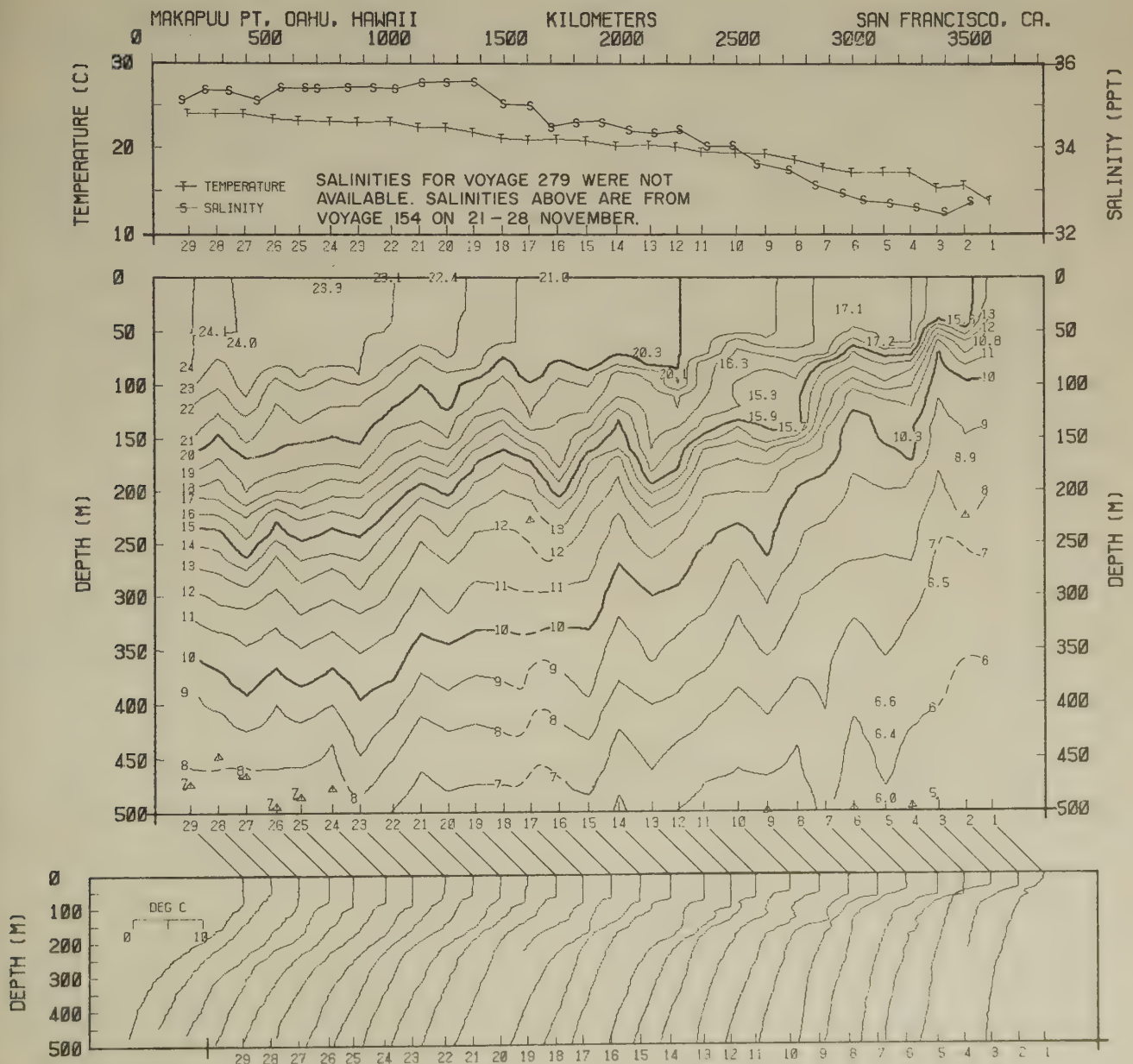

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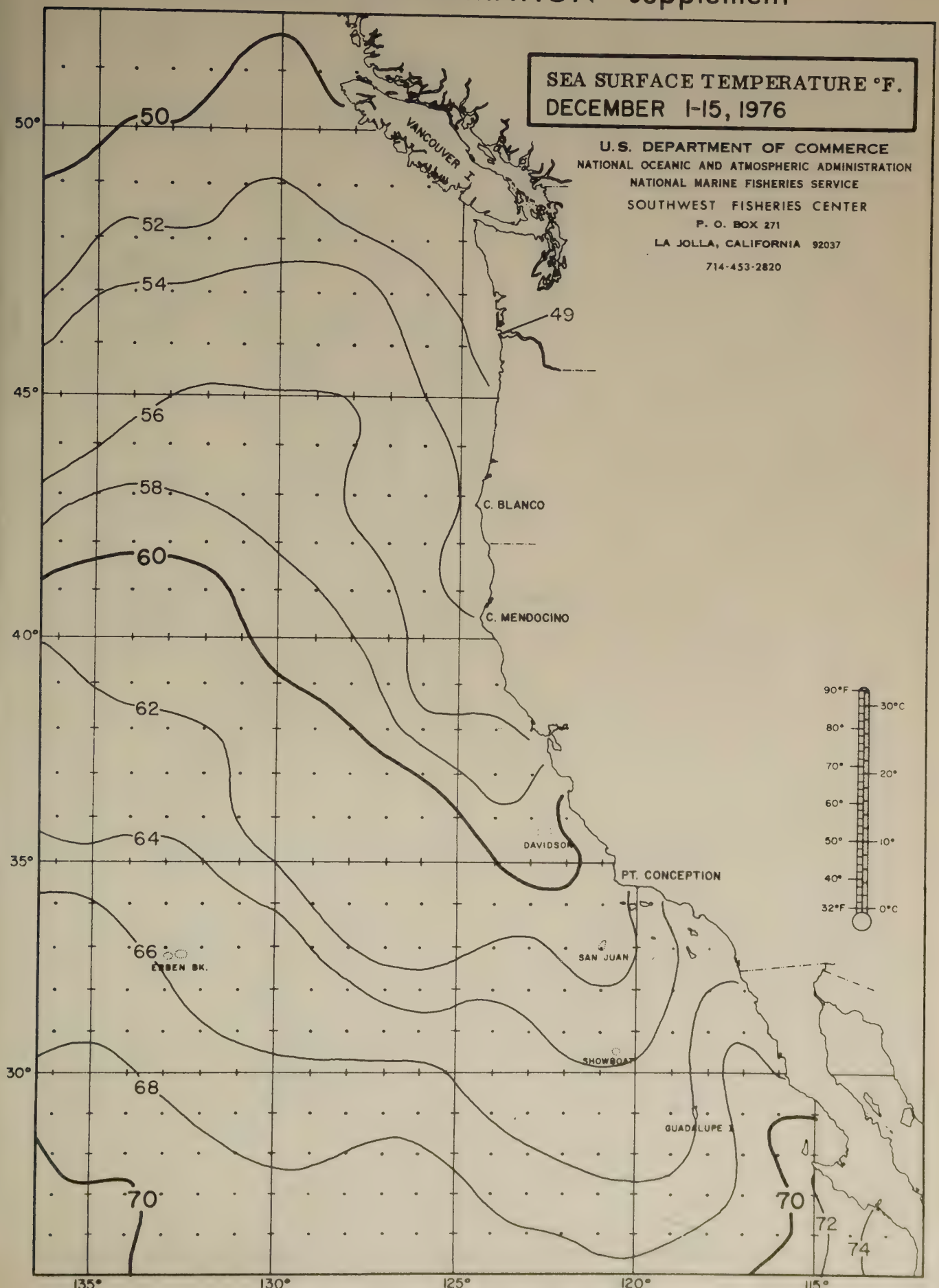

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